

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended): A device for providing dialysis solution~~a medical fluid~~ to a patient comprising:

a fluid receptacle, the fluid receptacle having a substantially hollow interior and defining an exterior surface;

a membrane receptacle adapted to receive dialysis solution, the membrane receptacle carried within the substantially hollow interior of the fluid receptacle;

at least two~~a plurality~~ of capacitor plates positioned adjacent to the exterior surface of the fluid receptacle, the at least two capacitor plates arranged in an opposing mannerto define a space between the plates;

a fluid receptacle positioned within the space;

a circuit electrically connected to the at least two~~a plurality~~ of capacitor plates, the circuit configured to produce an output signal ~~having an output~~ indicative of a volume of the dialysis solution~~fluid~~ in the membrane~~fluid~~ receptacle; and

a member for providing at least a portion of the dialysis solution within the membrane receptacle~~volume of the fluid~~ to or from a patient.
2. (currently amended): The device of Claim 1, wherein the membrane receptacle operates with a pump chamber having at least one fluid port.

3. (original): The device of Claim 2, wherein the capacitor plates have a shape that is substantially the same as the shape of the pump chamber.
4. (currently amended): The device of Claim 1, wherein the membrane receptacle includes at least one flexible membrane wall movable to pump medical fluid.
5. (currently amended): The device of Claim 1, wherein the membrane receptacle includes first and second flexible membrane walls, at least one of the first and second membrane walls being movable to change a volume of the receptacle.
6. (currently amended): The device of Claim 1, wherein the membrane receptacle includes a portion of a disposable dialysis fluid flow path useable with a dialysis machine.
7. (currently amended): The device of Claim 1, wherein at least one capacitor plate ~~of the plurality of capacitor plates has a non-planer shape.~~
8. (currently amended): The device of Claim 1, wherein the capacitor plates have a shape at least substantially the same as the exterior surface of the fluid receptacle ~~when the fluid receptacle is substantially full of fluid.~~

9. (original): The device of Claim 1, wherein the circuit charges the capacitor plates and measures a change in voltage from the capacitor plates over a time interval.
10. (original): The device of Claim 1, wherein the circuit further comprises:
a ground connection to one of the capacitor plates; and
a capacitance sensor circuit connected to another capacitor plate.
11. (original): The device of Claim 1, which includes a pair of substantially parallel capacitor plates.
12. (currently amended): A device for providing dialysis to a patient comprising:
a plurality of capacitor plates defining a space between the plates;
a fluid receptacle for holding a volume of dialysis fluid positioned within the space, the receptacle having a flexible membrane receptacle adapted to receive the dialysis fluid and operable to enable a relatively low dielectric fluid to be present at certain times between the receptacle and the plates;
a circuit electrically connected to the plurality of capacitor plates, the circuit having an output indicative of the volume of dialysis fluid in the fluid receptacle; and
a fluid line coupled to the patient to deliver at least a portion of the volume of dialysis fluid to or from the patient.

13. (currently amended): A device for providing continuous flow peritoneal dialysis comprising:
- a fluid receptacle;
- a flexible dialysis receptacle disposed within the fluid receptacle, the dialysis receptacle
- capable of being placed in fluid communication with a patient;
- first and second capacitor plates defining a space within and between which the fluid
- receptacle is located, the plates having a variable dielectric between the plates that
- is dependent on an amount of ~~dialysis~~-fluid in the dialysis receptacle; and
- an electrical circuit connected to the capacitor plates that creates a signal that is related to
- the variable dielectric.
14. (currently amended): A system for measuring a volume of a fluid to be provided to or
- from a patient, the system comprising:
- a fluid receptacle, the fluid receptacle carrying a flexible membrane receptacle capable of
- being fluidly connected to a patient;
- first and second capacitor plates defining a space within and between which the fluid
- receptacle is located, the plates having a variable dielectric between the plates that
- is dependent on an amount of a fluid in the flexible membrane~~fluid~~ receptacle;
- and
- an electrical circuit connected to the capacitor plates that creates a signal that is related to
- the variable dielectric.

15. (currently amended): The system of Claim 14, wherein the signal is indicative of the volume of the fluid in the flexible membrane~~fluid~~ receptacle.
16. (original): The system of Claim 14, wherein the signal is indicative of a volume of air in the fluid receptacle.
17. (currently amended): The system of Claim 14, wherein the signal is indicative of a portion of fluid in the flexible membrane receptacle and a portion of air in the fluid receptacle.
18. (original): The system of Claim 14, wherein the fluid receptacle operates inside of a fluid pump chamber.
19. (original): The system of Claim 18, wherein the capacitor plates have a shape substantially the same as the fluid pump chamber.
20. (original): The system of Claim 14, wherein the fluid receptacle is positioned between the first and second capacitor plates.

21. (withdrawn): The system of Claim 14, further comprising a pump piston, wherein one of the first and second capacitor plates defines an aperture that allows a portion of the piston to extend outside the plate.
22. (withdrawn): The system of Claim 14, further comprising a pump piston, wherein the pump piston moves between the capacitor plates.
23. (currently amended): The system of Claim 14, further comprising a displacement fluid that expands and contracts the flexible membrane ~~fluid~~-receptacle to fill and empty the fluid in and out of the receptacle.
24. (currently amended): The system of Claim 14, ~~which~~ wherein the fluid receptacle includes a pump chamber wall defining a port that can apply a negative pressure to the flexible membrane receptacle and pull at least a portion of one of the membrane ~~membranes~~ towards the port.
25. (original): The system of Claim 14, ~~which~~ wherein the fluid receptacle includes a pair of pump chamber walls each defining a port.
26. (original): The system of Claim 14, wherein at least one of the first and second capacitor plates is represented by the surface of the adjacent fluid.

27. (currently amended): The system of Claim 14, wherein the flexible membrane receptacle is part of a ~~fluid receptacle further comprises a disposable cassette, at least one wall of the cassette being a flexible membrane.~~
28. (original): The system of Claim 14, further comprising a processor that determines a volume of the fluid from the signal outputted by the electrical circuit.
29. (original): The system of Claim 14, further comprising a processor that determines a cumulative volume of fluid from a plurality of individual volumes of fluid in the fluid receptacle.
30. (original): The system of Claim 14, wherein the pair of capacitor plates have a shape substantially the same as the receptacle when the receptacle is full of fluid.
31. (currently amended): A system for measuring a volume of a fluid to be provided to or from a patient, the system comprising:

a fluid receptacle ~~that can be placed in fluid communication with the patient;~~

first and second capacitor plates positioned outside of and on opposing sides of the fluid receptacle;

a flexible membrane receptacle carried within the fluid receptacle, the flexible membrane in fluid communication with the patient; and

an electrical circuit providing a voltage source that enables a signal indicative of the volume of the fluid in the receptacle to be generated.

32. (original): The system of Claim 31, wherein the output signal is based on at least one of:
a variable dielectric between the plates, a changing surface area of one of the plates, and a changing distance between the plates.
33. (original): The system of Claim 31, wherein the signal is based on a varying dielectric constant between the fluid and air.
34. (original): The system of Claim 31, wherein the circuit charges the capacitor plates and measures a change in voltage from the capacitor plates over a time interval.
35. (original): The system of Claim 34, wherein the time interval is a fixed time interval.
36. (currently amended): A medical fluid delivery system, comprising:
a fluid flow path including a patient connection;
a membrane ~~fluid~~-receptacle positioned inside a chamber, the membrane receptacle so constructed and arranged to be in fluid communication with the fluid flow path;
and
a capacitance sensor positioned on opposing sides of an outer surface of the chamber and capable of accounting for an amount of a relatively low dielectric fluid existing

between the membrane receptacle and the chamber to indicate a volume of fluid in the receptacle.

37. (previously presented): The system of Claim 36, wherein the chamber is a pump chamber.
38. (original): The system of Claim 37, wherein the capacitance sensor further comprises first and second capacitor plates at opposite sides of the pump chamber.
39. (original): The system of Claim 38, wherein the capacitor plates have a shape substantially the same as part of the pump chamber.
40. (original): The system of Claim 36, wherein the capacitance sensor further comprises first and second capacitor plates positioned at opposite sides of the fluid receptacle.
41. (original): The system of Claim 36, wherein the capacitance sensor includes at least one capacitor plate having a non-planer shape.
42. (currently amended): The system of Claim 36, wherein the ~~fluid~~-membrane receptacle is part of a disposable set.

43. (original): The system of Claim 36, wherein the capacitance sensor comprises first and second capacitor plates and an electrical circuit connected to the plates.
44. (original): The system of Claim 36, wherein the pair of capacitor plates have a shape substantially the same as the fluid receptacle when the fluid receptacle is substantially full of fluid.
45. (original): The system of Claim 36, wherein the medical fluid delivery system is a dialysis system.
46. (original): The system of Claim 45, wherein the dialysis system is a continuous flow peritoneal dialysis system.
47. (currently amended): A dialysis system, comprising:
a fluid flow mechanism having a flexible membrane receptacle arranged to convey~~able of conveying~~ a fluid during a dialysis treatment; and
a fluid volume capacitance sensor having first and second capacitor plates each positioned and arranged on an opposing side of the fluid flow mechanism to measure a volume of the fluid conveyed by the flexible membrane receptacle during the dialysis treatment.

48. (original): The dialysis system of Claim 47, wherein the fluid flow mechanism is a continuous flow mechanism capable of performing continuous flow dialysis.
49. (original): The dialysis system of Claim 47, wherein the fluid flow mechanism is fluidly connected to a peritoneal dialysis catheter.
50. (original): The dialysis system of Claim 47, wherein the fluid flow mechanism is fluidly connected to a plurality of peritoneal access lumens.
51. (currently amended): A method of measuring a volume of a medical fluid pumped by a fluid pump, comprising the steps of:
- sensing a first state of a medical fluid receptacle located within a space defined between a pair of capacitor plates when a flexible membrane receptacle within the medical fluid receptacle is substantially empty of fluid so that a relatively low dielectric fluid exists between the plates and the receptacle;
- providing the medical fluid to the flexible membrane ~~fluid~~-receptacle;
- sensing a second state of the fluid receptacle with the capacitor plates when the flexible membrane~~fluid receptacle~~ is substantially full of medical fluid; and
- determining a volume of the medical fluid in the fluid receptacle based on the first and second states sensed by the capacitor plates.

52. (currently amended): The method of Claim 51 further comprising the steps of:

substantially emptying the flexible membrane ~~fluid~~-receptacle of fluid; and

providing additional medical fluid to the flexible membrane receptacle, sensing another

second state, and determining another volume of the medical fluid.
53. (currently amended): The method of Claim 51, which includes continuously sensing the

state of the ~~fluid-receptacle~~-flexible membrane receptacle as the fluid enters the fluid

receptacle.
54. (currently amended): The method of Claim 51, which includes determining a total

volume of fluid from a plurality of volumes of medical fluid provided to the flexible

membrane receptacle.
55. (original): The method of Claim 51, which includes knowing a total amount of medical

fluid needed by a patient and stopping the provision of the medical fluid when the total

amount has been provided.
56. (original): The method of Claim 51, which includes determining a volume of air in the

fluid receptacle based on the first and second states sensed by the capacitor plates.

57. (currently amended): A method of providing dialysis to a patient, comprising the steps of:

measuring a volume of dialysis fluid having a sequentially changing inverse relationship with a relatively low dielectric fluid, the dialysis fluid located within a receptacle, the receptacle positioned within a space defined by first and second plates of a capacitance sensor; and
~~passing~~pumping a portion of the volume of the dialysis fluid into a portion of a patient using a flexible membrane supported within the receptacle.

58. (original): The method of Claim 57, wherein the portion includes a peritoneal cavity of the patient.

59. (original): The method of Claim 57, wherein the measuring step further comprises measuring the volume of dialysis fluid in a pump chamber.

Claims 60 to 72 (canceled)